

FIGURE 7. This figure compares a 1999 aerial photograph of the complex barrier island in the Kitty Hawk area of North Carolina (Panel A) with a 1932 aerial photograph of the same region (Panel B). The photographs show: 1) the younger overwash-dominated part of the island being welded onto the ocean side of the older ridge and swale part of the barrier, 2) the complete urbanization of the younger overwash portion of the island by 1999, and 3) rapid ocean shoreline recession as indicated by the reduced distance of Highway 12 from the ocean over time. In 1999, a section of Highway 12 is covered by overwash sand. Figure is modified from Riggs and Ames (2003).

to an equilibrium point that is dictated by the normal hydrodynamics of the estuarine-oceanic system.

Inlets are essential for barrier island evolution by building extensive shallow sand shoals known as flood-tide deltas (FTDs) within the estuary behind the barrier islands and ebb-tide deltas (ETDs) on the ocean side of an inlet (Fig. 5). The FTD sand shoals form the foundation that the barrier island migrates onto in response to sea-level rise. Once an inlet closes, the FTD develops into marsh and adds width to the island (Fig. 8A-C). FTDs and ETDs store sand and are critical components of the coastal sediment budget. During storm events they bypass sand up and down the ocean shoreline, as well as in and out through the inlet.

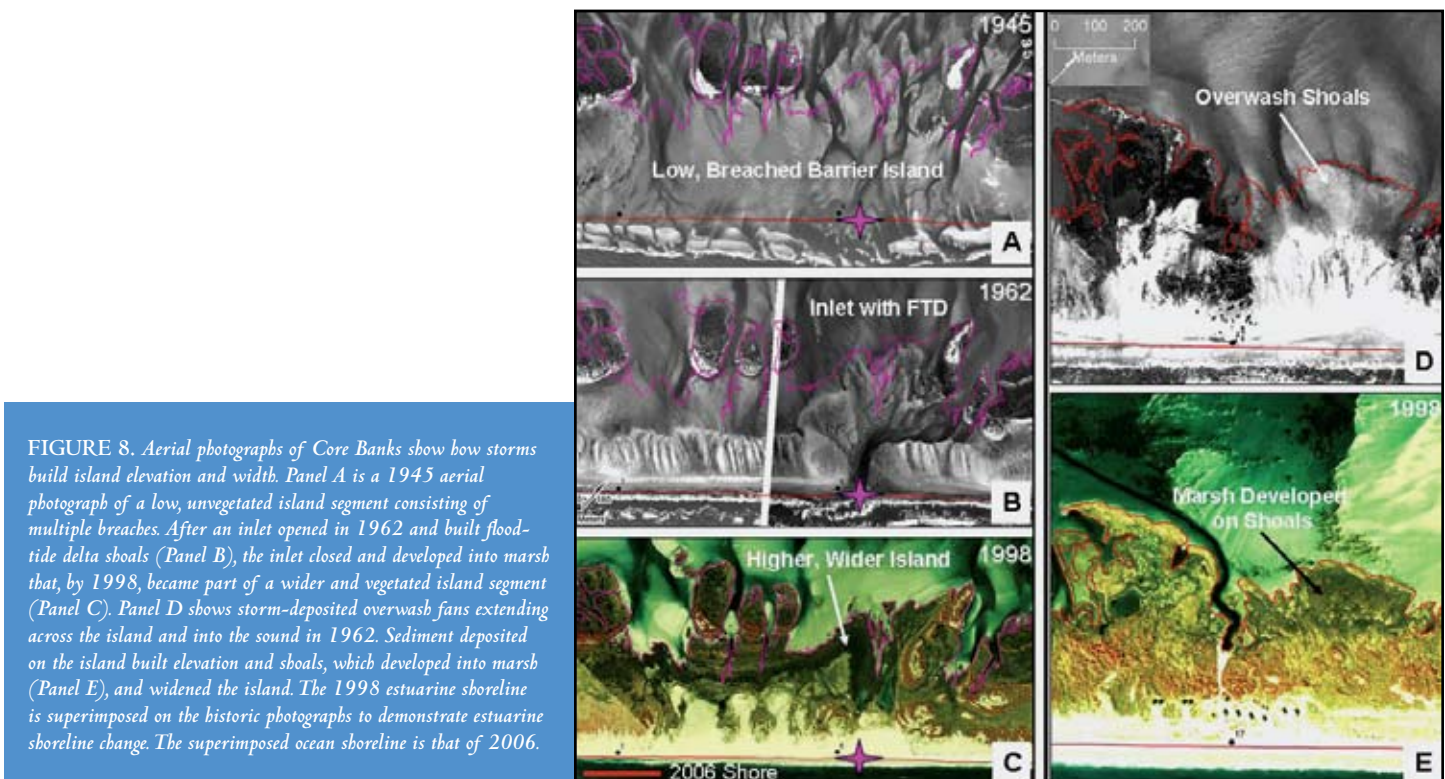


FIGURE 8. Aerial photographs of Core Banks show how storms build island elevation and width. Panel A is a 1945 aerial photograph of a low, unvegetated island segment consisting of multiple breaches. After an inlet opened in 1962 and built flood-tide delta shoals (Panel B), the inlet closed and developed into marsh that, by 1998, became part of a wider and vegetated island segment (Panel C). Panel D shows storm-deposited overwash fans extending across the island and into the sound in 1962. Sediment deposited on the island built elevation and shoals, which developed into marsh (Panel E), and widened the island. The 1998 estuarine shoreline is superimposed on the historic photographs to demonstrate estuarine shoreline change. The superimposed ocean shoreline is that of 2006.